

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)BCom DEGREE EXAMINATION DECEMBER 2023
(First Semester)Common to Branches - COMMERCE (CA)/ E- COMMERCE/ COMMERCE (PA)/
COMMERCE (A&F)/ COMMERCE (B&I)MATHEMATICS FOR COMMERCE

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks ($10 \times 1 = 10$)

All Questions are Multiple Choice

Module No.	Question No.	Question	K Level	CO
1	1	Find 150% of 32,200 a) 48,300 b) 44,300 c) 48,400 d) 48,500	K1	CO1
	2	Infer the n^{th} term of a geometric series is a) ar^{n-1} b) ar^n c) ar^{n+1} d) ar	K2	CO1
2	3	Recall the associative property of the matrices a) $A(B + C) = AB + AC$ b) $A + B = B + A$ c) $A + (B + C) = (A + B) + C$ d) $AB = BA$	K1	CO2
	4	In the system of linear equations $AX=B$, if $B=0$, then the system is a _____ system a) non-homogeneous b) homogeneous c) linear d) non-linear	K2	CO2
3	5	What is the derivative of a^x ? a) xa^{x-1} b) $\frac{x^a}{a+1}$ c) $\log_e a a^x$ d) $\log_e x a^x$	K1	CO3
	6	If $xy = c^2$, then $\frac{dy}{dx} = ______$ a) $-\frac{y}{x}$ b) $-\frac{x}{y}$ b) $\frac{y}{x}$ d) $\frac{y}{x}$	K2	CO3
4	7	Choose the value of $\int (e^x - 1) dx$ a) $e^x - x + c$ b) $e^x + x + c$ c) $e^{-x} - x + c$ d) $e^{-x} + x + c$	K1	CO4
	8	Infer the value of $\int_0^2 (x^2 - 4x + 5) dx$ a) $\frac{14}{3}$ b) $\frac{11}{3}$ c) $\frac{8}{3}$ d) $\frac{7}{3}$	K2	CO4

Cont...

5	9	Recall the non-negative variable added to the L.H.S of a constraint in \leq type to make it into = type is a variable a) slack c) equality	b) surplus d) canonical	K1	CO5
	10	Infer that when all the basic variables are non-zero, the basic solution is called _____ a) degenerate c) infinite	b) non-degenerate d) unbounded	K2	CO5

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	A person has two daughters A and B aged 13 and 16 years. He has Rs. 4,000 with him now but wants that both of them should get the equal amount when they are 20 years old. How he should divide the money if it were to be deposited in a bank giving 9% compound interest per annum?	K3	CO1
	(OR)			
	11.b.	A person borrowed a sum of Rs.3500 on the condition to repay in 23 monthly instalments of Rs.150 and the last instalment is Rs.50. Calculate the simple interest at the rate of 5% per annum which he has to pay as the 25 th instalment.		
2	12.a.	Find the inverse of $\begin{bmatrix} 4 & 0 & 2 \\ 2 & 10 & 2 \\ 3 & 9 & 1 \end{bmatrix}$ by elementary operations.	K3	CO2
	(OR)			
	12.b.	Solve by adjoint matrix method: $5x + 3y + 7z = 4$ $3x + 26y + 2z = 9$ $7x + 2y + 11z = 25$		
3	13.a.	Find the derivative of $\log\left(\frac{x^2+1}{x^2-1}\right)$.	K3	CO3
	OR			
	13.b.	If $y = ae^{mx} + be^{-mx}$, show that $\left(\frac{d^2y}{dx^2} = m^2y\right)$.		
4	14.a.	Evaluate $\int \frac{x^3-x+4}{x^2} dx$.	K3	CO4
	(OR)			
	14.b.	Evaluate $\int \frac{dx}{x^2-a^2} = \frac{1}{2a} \log_e\left(\frac{x-a}{x+a}\right) + c$ if $x > a$		

Cont...

5	15.a.	A manufacturer produces 2 types of models M_1 and M_2 . Each model M_1 requires 4 hours of grinding and 2 hours of polishing whereas each M_2 model requires 2 hours of grinding and 5 hours of polishing. The manufacturer has 2 grinders and 3 polishers. Each grinder works for 40 hours a week and each polisher works for 60 hours a week. Profit on an M_1 model is Rs.3 and on an M_2 model is Rs.4. Whatever is produced in a week is sold in the market. How should the manufacturer allocate his production capacity to the 2 types of models so that he may make profit the maximum in a week?	K3	CO4
	15.b.	(OR) Solve graphically: $\min z = 3x_1 + 5x_2$ subject to $x_1 + x_2 \geq 200$ $x_1 \leq 80$ $x_2 \geq 60$ $x_1, x_2 \geq 0$.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO																						
1	16	An item is purchased for Rs. 10,000. a) If the depreciation is 9% per annum, find the value of the machine after 10 years. b) if the depreciation is 6% per annum for the first 4 years and 9% per annum for the next 6 years, what is the value of the machine.	K4	CO1																						
2	17	Consider an economy of 2 industries P and Q where the data in millions of rupees is given below. Determine the output if the final demand changes to 20 for P and 30 for Q. <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th></th> <th>User</th> <th>Final</th> <th>Total</th> </tr> <tr> <th></th> <th></th> <th>P</th> <th>Q</th> <th>Demand</th> </tr> </thead> <tbody> <tr> <td>Producer</td> <td>P</td> <td>14</td> <td>6</td> <td>8</td> <td>28</td> </tr> <tr> <td></td> <td>Q</td> <td>7</td> <td>18</td> <td>11</td> <td>36</td> </tr> </tbody> </table>			User	Final	Total			P	Q	Demand	Producer	P	14	6	8	28		Q	7	18	11	36	K4	CO2
		User	Final	Total																						
		P	Q	Demand																						
Producer	P	14	6	8	28																					
	Q	7	18	11	36																					
3	18	A firm sells a product at Rs.3 per unit. The total cost of the firm for producing x units is given by $c = 20 + 0.6x + 0.01x^2$. How many units should be made to achieve maximum profit? Verify that the condition for maximum is satisfied.	K4	CO3																						
4	19	Solve $\int x^2 e^x dx$ by integration by parts.	K4	CO4																						
5	20	Solve the L.P.P by simplex method $\max z = 3x_1 + 4x_2$ subject to $4x_1 + 2x_2 \leq 80$ $2x_1 + 5x_2 \leq 180$ $x_1, x_2 \geq 0$.	K4	CO5																						